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Claim No. IP-2022-000070

IN THE HIGH COURT OF JUSTICE

BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES

INTELLECTUAL PROPERTY LIST (ChD)

INTELLECTUAL PROPERTY ENTERPRISE COURT

Judgment handed down remotely
Date: Tuesday 24th October 2023

Before:
NICHOLAS CADDICK K.C.
(sitting as a Deputy High Court Judge)

BETWEEN:

EnOCEAN GmbH

Claimant

-and-

(1) FAR EASTERN MANUFACTURING LIMITED

(2) TLC (SOUTHERN) LIMITED

Defendants

- -

MICHAEL CONWAY (instructed by **EIP**) for the Claimant
JONATHAN HILL (instructed by **Agile IP**) for the Defendants

- -

Hearing dates: 21st and 22nd September 2023

- -

JUDGMENT

Nicholas Caddick K.C. (sitting as a Deputy High Court Judge):

Introduction

1. In this action the Claimant, EnOcean GmbH, asserts that Claims 1 and 3 of its patent, EP (UK) 1 611 663 B3, entitled "electromagnetic energy converter" ("the Patent"), have been infringed by a product known as the Quinetic Wireless Switch which the Defendants, Far Eastern Manufacturing Limited and TLC (Southern) Limited, are importing into and marketing in the UK.

2. The Patent, which was filed on 18 March 2004, relates to the powering of devices such as radio switches and radio sensors using an electromagnetic energy converter rather than, for example, battery or solar power.

3. The Defendants do not dispute that the Quinetic Wireless Switch falls within Claims 1 and 3 of the Patent. However, they assert that the Patent is invalid because its claims lack novelty and/or are obvious in light of two pieces of prior art, namely:

    a. UK Patent No. GB 879,938 ("Harding"); and
    b. European Patent Application No. EP 0 836 166 A1 ("Goiran").

    In its Defence to Counterclaim, the Claimant asserted that the Claims 1 and 3 of the Patent were both independently valid. It did not assert that the Patent was valid on the basis of any of the other claims. By trial, however, the Claimant had accepted that Claim 1 was not valid over Goiran so that the issues (as expressed in its opening skeleton) were as to the validity of claims 1 and 3 over Harding and the validity of claim 3 over Goiran.

The witnesses

4. The only evidence was that of the parties' expert witnesses.

5. The Claimant's expert witness was Professor Paul Mitcheson, Professor of Electrical Energy Conversion at Imperial College London. He has specialised in energy harvesting devices since his PhD in 2001-2005 and has authored a large number of scientific papers and several books on energy harvesting and wireless energy supply. He has also co-founded several companies and is an inventor on seventeen patent families and applications. His experience is, therefore, highly relevant to the issues before me. In closing Mr Hill (for the Defendants) suggested that Professor Mitcheson had shown a certain argumentativeness and a tendency to defend his client's position. I do not accept that criticism. I have no doubt that

Professor Mitcheson was trying to assist the court and I found his evidence to be helpful.

6. The Defendants' expert was Professor Christopher Chatwin who is a Chartered Engineer and a Professor of Engineering at the University of Sussex. His research has involved designing technologies in a wide range of areas, from biomedical engineering to space and satellite systems. Mr Conway (for the Claimant) argued that Professor Chatwin was less able to assist me because, in his report, he had defined the skilled person in broader terms than those which were ultimately agreed at trial and because the breadth of his experience and his willingness to work in new areas made it difficult for him to step into the shoes of the skilled person for the purposes of the Patent. It is certainly true that in his oral evidence, Professor Chatwin rowed back from some assertions that he had made in his reports. It is also the case that his style was (as Mr Hill put it) more rough and ready and given with less of a view to the niceties of patent law than was the case with Professor Mitcheson. Nevertheless, I found his evidence helpful and, again, I have no doubt that he was doing his best to assist the court, as the instances of rowing back showed. A particular criticism levelled by Mr Conway against Professor Chatwin was that his assessment of the prior art was based on a comparison with the Patent and was, therefore, tainted by hindsight. However, as Mr Hill pointed out, to the extent that Professor Chatwin was being asked to address the issue of anticipation (novelty), some sort of comparison was inevitable.

The Skilled Person

7. A patent is directed at the skilled person and issues of construction and obviousness are addressed through the eyes of the skilled person. The skilled person is a notional person (or, in some cases, a team of notional persons) with a practical interest in the subject matter of the invention and with practical knowledge and experience of the kind of area in which the invention is to be used. Whilst the skilled person is a notional person, the skills attributed to such person must be those that real life people skilled in the relevant art would in fact have had as at the priority date which, here, is 7 April 2003.

8. In this case, as Professor Mitcheson explained, the Patent is directed to providing an improved method of powering small, low power remote control switches (such as, for example, switches remotely to lock/unlock the doors of a car). On this basis, Professor Mitcheson argued that the skilled person would be an electronic engineer with some experience in the design of similar low power electronic devices with, probably, a master's degree in electrical/electronic engineering and a few years' experience designing small electronic devices within industry. The skilled person would be familiar with concepts of circuit design and electromagnetics, but would be unlikely to have direct experience of designing an energy harvesting device.

9. Although, in his report, Professor Chatwin had defined the skilled person in broader terms ("a designer of electronic devices"), at trial, he and the Defendants were happy to adopt Professor Mitcheson's narrower definition. There were, however, differences between the parties (to which I will return) with regard to the skilled person's mindset regarding the prior art and level of interest in it.

The common general knowledge

10. The common general knowledge comprises matters that are generally known and generally regarded as a good basis for further action by the bulk of those involved in the particular art as at the relevant date (7 April 2003). It includes information within the memory of the skilled person and also information that the skilled person knows exists and would, if needed, look up as a matter of course.

11. In the present case, the parties produced a Statement setting out certain matters that were agreed to be common general knowledge. They also identified a number of areas of dispute. For present purposes, I will summarise those matters of common general knowledge which seem to me to be important to the technology described in the Patent. I will deal with some further aspects of the common general knowledge when I consider issues of construction relating to the Patent and the prior art. The relevance of some of the areas of dispute was unclear and I will make no findings in relation to these.

Matters agreed to be common general knowledge

12. It was common ground that the skilled person would have been aware that there was a wide range of small electronic devices requiring some sort of power source. It was also agreed that batteries were the "go-to" power source for many of these devices. This was because battery technology was improving and, by 7 April 2003, batteries were reliable, relatively cheap and available in various standardised sizes and voltages.

13. Nevertheless, the skilled person would also have been aware of (even if he or she did not have had any direct experience of dealing with) certain alternative power sources using what were referred to as "energy harvesting" techniques. These alternatives sources included:

    a. The Seiko kinetic watch mechanism – a mechanism whereby a rotating electromagnetic generator is powered by movements of the watch wearer's arm;
    b. Solar powered calculators;
    c. Crystal radio – where a radio's headphones are powered by the radio signal alone;
    d. Piezo spark igniters – where a spark (used for lighting a gas oven, or a cooker hob, or a cigarette) is created from the voltage generated where mechanical energy (the push of a button by a user) operates to strain or deform a piezoelectric element;

e. Bicycle dynamos – where a rotating electromagnetic generator powered by the rotation of a bicycle wheel is used to provide power for bicycle lights; and
f. Wind-up radio – where power is generated by a spring "charged" by the turning of a crank by the user.

14. The skilled person would also have been familiar with the basic principles of magnetic attraction and/or repulsion between magnetic elements, and with the basic principles by which mechanical energy can be converted into an electrical current, and with the principles of electromagnetic induction. In this regard, the following would have been common general knowledge:

a. A mechanical to electrical energy conversion transducer comprises two parts that move relative to each other (as in bicycle dynamos) or contain a part that deforms (as in the piezo spark lighters).
b. An example of the first of these types of transducer is where a coil of wire is exposed to a change in magnetic flux, thereby inducing an electrical current. In accordance with Faraday's law, the voltage induced depends on the number of turns in the coil and the rate of change of magnetic flux;
c. A change in magnetic flux can be induced by moving a permanent magnet relative to a coil of wire. Alternatively, it can be induced by changing the reluctance of a magnetic circuit (by, for example, moving a piece so as to open or close an air gap in a magnetic circuit). In either case, the faster the movement, the greater the rate of change of magnetic flux and the greater the magnitude of voltage induced; and
d. A current-carrying wire in a magnetic field experiences a force which acts to reduce the relative change in magnetic flux (Lenz's law). It is this force against which work is done in a mechanical-to-electrical energy converter: i.e. the mechanical energy is used to move a magnet relative to a coil of wire or to open or close an air gap in a magnetic circuit in proximity to a coil.

The two points of disagreement

15. In their list of issues, the parties identified two specific points of disagreement with regard to the common general knowledge. I will deal with the first of these (whether the concept of "magnetic springs" was common general knowledge) when considering the construction of Claim 3. The second point is no longer in issue as, when giving evidence in chief, Professor Chatwin accepted that the use of a circuit powered by mechanical input provided by a human user to power a signal transmitter was not common general knowledge at the priority date.

The Patent

16. As mentioned above, the Patent has a priority date of 7 April 2003 and is entitled "Electromagnetic energy converter". It is, however, directed at the use of such

converters in radio switches and radio sensors, as appears from paragraph [0001] of the "Description" which states that:

> "The invention relates to an electromagnetic energy converter comprising at least one permanent magnet, a moving element, an electrical coil surrounding at least part of the permanent magnet or the moving element, and the use of such an electromagnetic energy converter in radio switches and radio sensors."

17. Paragraph [0002] describes the problem which the Patent was intended to address. It points out that electromagnetic transducers were known in many embodiments such as generators. It goes on to state that:

> "[t]he power for electrical or electronic circuits, in particular for miniature circuits or small and very small devices or control elements, such as radio switches or radio sensors, is frequently provided by battery and/or solar energy, accumulators or similar".

Such power sources, paragraph [0002] notes, had the disadvantage that their size often greatly exceeded the size of the electronic circuit, "thereby negating the space and weight advantages gained from miniaturisation". A radio switch used in motor vehicle locking systems and powered by battery or accumulator was given as an example of this. A "further significant disadvantage" was said to be that such systems:

> "are not maintenance-free, particularly if the power supply is supported by a battery or accumulator. This is because batteries and accumulators are particularly liable to aging and must be replaced at predefined intervals."

18. Paragraphs [0003]-[0006] deal with some prior art patent applications, three of which used the opening and closure of magnetic circuits to generate electrical power. However, paragraph [0007] points out that these three applications used forms of energy which were not directly influenced by the user, which it says is a disadvantage "if the electrical power is required to supply small and very small devices or control elements, such as radio switches." Paragraph [0008] then says that the object of the invention is to provide an electromagnetic converter which does not suffer from that disadvantage and paragraph [0009] asserts that the problem is solved in the invention by the measures proposed in claim 1 of the Patent.

19. Paragraph [0010] states that claim 1:

> " … proposes an electromagnetic energy converter for power supply comprising at least one permanent magnet and an electrical coil and a moving element, wherein the coil surrounds at least a part of the permanent magnet or at least a part of the moving element. The electromagnetic energy converter is designed in such a way that a magnetic circuit formed by the permanent magnet and the moving element is closed or opened by a

> movement of the moving element. The magnetic circuit is not opened or closed in a slowly increasing, steady manner, but essentially abruptly, similar to the closing or opening of a switch. This abruptness results in an equally abrupt change in magnetic flux which induces an electric current in the coil. This electric current is subsequently used to supply power to a downstream electronic circuit, for example a radio switch for motor vehicle locking systems".

As noted above, it was common general knowledge that, in accordance with Faraday's law, an abrupt change in magnetic flux (such as that described in paragraph [0010]) would induce a larger voltage and cause more power to be supplied.

20. Paragraph [0011] then describes "an advantageous embodiment" in which the moving element is formed of a soft-magnetic core and is held in a first or second rest position by magnetic latching forces. It notes that, as it is the change in magnetic flux that induces an electric current, it does not matter in which rest position the circuit is open or closed. It also notes that one can use the fact that the current has different polarity when opening or closing to convey information - although this is not something that features in the claims of the Patent that were in issue in this case.

21. Paragraph [0012] describes a further advantageous embodiment whereby:

> "the moving element is extended by a spring element in such a way that one of the two positions that can be occupied by the moving element represents a stable position".

Paragraph [0012] continues:

> "When actuated, the moving element is then moved against a spring force until the magnetic circuit is either opened or closed. When the moving element is released, it is pushed back into its original rest position by the spring force, resulting in the magnetic circuit being both opened and closed again. The advantage here is that the electrical current is induced twice…".

The paragraph concludes by pointing out that the addition of the spring element doubles the electric power generated by the electromagnetic energy converter.

22. Paragraph [0013] then describes another advantageous embodiment – namely that the moving element is "equipped with a dead-center mechanism in connection with the spring element."[1] This mechanism operates so that, when the dead-centre position is exceeded, the moving element moves to the second rest position automatically with no further effort. This means that after the dead-centre position

[1] The translation of the Patent uses the US spelling ("center") which I have retained when quoting from the Patent.

is reached, the intensity of movement and, as a result, the intensity of induced electrical energy is always the same.

23. Paragraph [0014] says:

> "It is further advantageous to structurally combine the moving element and the spring element and also to form the permanent magnet from two concentric rings which are connected via a circular base plate … it is further advantageous especially in this embodiment, to tension the moving element in structural unity with a spring element in a dome shape over the concentric rings, thereby forming a circular energy converter. When the spring element is pressed in the center of the dome shape, the dome will snap over like a spring when the dead-center is reached, and then close the electromagnetic circuit and open it again in the same way."

24. Paragraph [0015] describes a further advantageous embodiment by which one of the concentric rings "is connected to the spring element in such a way that it is moved with the spring element" thereby moving the electrical coil relative to a permanent magnet and inducing more power.

25. Paragraph [0016] makes the point that "[f]ollowing the principle described above", the energy converter can be miniaturised and adapted to the shape and size of a button cell battery and can supply power "exactly when needed to perform an action" and without the need to provide storage for the electrical power. It goes on to assert that "[t]here is no need for an additional switching element, as this is formed in a functional unit with the energy converter." The paragraph concludes that "the potential uses are almost limitless. The use for the power supply of wireless switches is mentioned here as an example".

26. Paragraph [0017] stresses, again, that the invention "is particularly suitable for use in wireless switches, for example." Paragraph [0018] describes its operation:

> "A user operates an energy converter the size of a button, in which pressing the energy converter converts mechanical energy into electrical energy by closing the magnetic circuit. The electrical energy thereby induced is immediately used in an electronic circuit to emit a radio signal, and this radio signal subsequently triggers an action at a radio receiver or at devices connected to it. An example is a motor vehicle locking system."

27. Paragraphs [0019] to [0034] further explain the invention by reference to the embodiment shown in Figures 1 and 2. Paragraph [0021] explains that Figure 1 shows an electromagnetic energy converter with an electric coil embedded in two concentric circles formed by a permanent magnet. It states that the electrical current induced in the coil is conducted to "a consumer. For example, the energy autonomous switch in the form of an electronic circuit shown schematically in Figure 2".

28. Mr Hill's skeleton reproduced Figures 1 and 2, with annotations added to explain the numbered references, as follows:

FIG 1

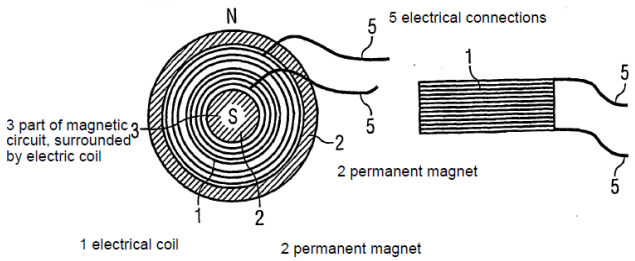
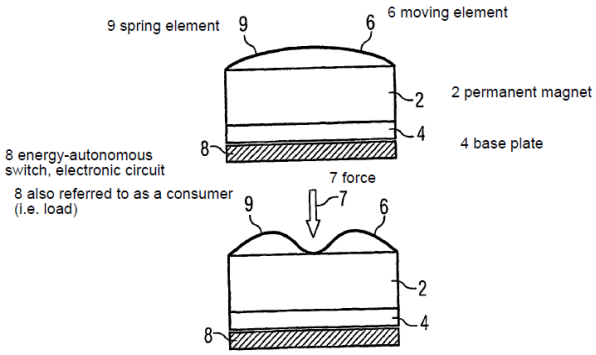


FIG 2



29. Paragraphs [0022], [0025] and [0026] explain, and Figure 2 illustrates, how a current is induced in this embodiment. The moving element and the spring element are combined to form a dome positioned over the coil and permanent magnet. The dome, when pressed, initially retains its shape until it reaches a point where it "snaps over" which causes the magnetic circuit to close thereby generating power. This, therefore, utilises the sort of abrupt action and dead-centre mechanism to which the Patent had referred at paragraphs [0010] and [0013]. Then, when released, the dome snaps back from the unstable position into which it has been pushed and to its original stable position and, in the process, generates more power (as explained by the Patent at paragraphs [0012] and [0030]). The way in which the dome snaps over and then back again was described by the parties as being similar to the operation of the button sometimes found on the top of a jam jar which Professor Mitcheson accepted would form part of the common general knowledge.

30. It is worth noting that the Patent does not provide any details as to the dimensions or characteristics of the spring or of the moving element nor as to the nature of the circuitry involved. It is assumed that the skilled person reading the Patent could work out such matters and the Defendants do not suggest that the Patent is insufficient in this regard.

31. The relevant claims of the Patent are claims 1 and 3 which have been broken down into agreed integers as follows:

Claim 1

> **1.1**: The use of an electromagnetic energy converter, wherein the electromagnetic energy converter comprising at least
>
> **1.2**: one permanent magnet and
>
> **1.3**: a moving element,
>
> **1.4**: wherein an electrical coil surrounds at least a part of the permanent magnet or the moving element,
>
> **1.5**: wherein any movement of the moving element from a first rest position or from a second rest position leads to opening or to closing of a magnetic circuit which is formed by the permanent magnet and the moving element,
>
> **1.6**: and the moving element is held in the first or the second rest position by magnetic latching forces,
>
> **1.7**: wherein the moving element is provided with a dead-center mechanism, which results in rapid opening or closing of the magnetic circuit as soon as a predetermined force acting on the moving element is exceeded,
>
> **1.8**: wherein an autonomous-power switch, for example a radio switch or a signal transmitter, is supplied with electrical power by the electromagnetic converter,
>
> **1.9**: and the electrical power is stored in a capacitor.

Claim 3

> **3.1**: Use of an electromagnetic energy converter according to either of the preceding patent claims, wherein a spring element makes the second rest position unstable, so that the moving element returns to the first rest position after a movement to the second rest position.

Construction

32. The issues with regard to the validity of the Patent relate to integer 1.8 and the integers of claim 3 over and above those of claim 1. In relation to those integers, there were differences between the parties over how the skilled person would construe the words "an autonomous-power switch" in integer 1.8 and "a spring element" in integer 3.

33. There was no dispute between the parties regarding the correct approach to issues of construction. As noted by Meade J in *Add2 Research v Dspace* [2021] EWHC 1630, at [91]:

"91. The principles of purposive claim interpretation are well known. The Defendants referred to the judgment of Floyd LJ in *Saab Seaeye Limited v Atlas Elektronik* [2017] EWCA Civ 2175 at [18] and [19]:

"18. There was no dispute about the principles which apply to the construction of patent claims. Both parties relied, as did the judge, on the summary in this court's judgment in *Virgin Atlantic v Premium Aircraft* [2010] RPC 8 at [5]:

'(i) The first overarching principle is that contained in Article 69 of the European Patent Convention.

(ii) Article 69 says that the extent of protection is determined by the claims. It goes on to say that the description and drawings shall be used to interpret the claims. In short the claims are to be construed in context.

(iii) It follows that the claims are to be construed purposively – the inventor's purpose being ascertained from the description and drawings.

(iv) It further follows that the claims must not be construed as if they stood alone – the drawings and description only being used to resolve any ambiguity. Purpose is vital to the construction of claims.

(v) When ascertaining the inventor's purpose, it must be remembered that he may have several purposes depending on the level of generality of his invention. Typically, for instance, an inventor may have one, generally more than one, specific embodiment as well as a generalised concept. But there is no presumption that the patentee necessarily intended the widest possible meaning consistent with his purpose be given to the words that he used: purpose and meaning are different.

(vi) Thus purpose is not the be-all and end-all. One is still at the end of the day concerned with the meaning of the language used. Hence the other extreme of the Protocol – a mere guideline – is also ruled out by Article 69 itself. It is the terms of the claims which delineate the patentee's territory.

(vii) It follows that if the patentee has included what is obviously a deliberate limitation in his claims, it must have a meaning. One cannot disregard obviously intentional elements.

(viii) It also follows that where a patentee has used a word or phrase which, acontextually, might have a particular meaning (narrow or wide) it does not necessarily have that meaning in context.

(ix) It further follows that there is no general 'doctrine of equivalents.'

(x) On the other hand purposive construction can lead to the conclusion that a technically trivial or minor difference between an element of a claim and the corresponding element of the alleged infringement nonetheless falls within the meaning of

> the element when read purposively. This is not because there is a doctrine of equivalents: it is because that is the fair way to read the claim in context.
>
> (xi) Finally purposive construction leads one to eschew the kind of meticulous verbal analysis which lawyers are too often tempted by their training to indulge.'
>
> 19. Sub-paragraph (ix) must now be read in the light of the Supreme Court's judgment in *Actavis v Lilly* [2017] UKSC 48 , which explains that, at least when considering the scope of protection, there is now a second question, to be asked after the patent claim has been interpreted, which is designed to take account of equivalents. There was some reference in the written arguments to the impact of that decision on the present case. In the end, however, Mr Mellor disclaimed any reliance on any doctrine of equivalence for the purposes of supporting an expansive scope of claim in the context of invalidity. That issue will therefore have to await a case in which we are called upon to decide it."

34. In *Add2 Research* at [92] Meade J then went on to comment:

> 92. Principle (v) is important in the present case. Counsel for the Defendants submitted that given that there is only one preferred embodiment, it was more likely than if there had been multiple embodiments that the patentee had chosen claim terms to correspond to the preferred embodiment, rather than to have a more general meaning. I do not accept this. Even where there is only one preferred embodiment the patentee is likely to have had a generalised concept in mind, and it is necessary to work out from the language whether that is so, and what the concept is. Multiple preferred embodiments may, by their consistency, give further clues as to what the claims were intended to mean, but general claim language cannot be restricted to the preferred embodiment just because there is only one."

Meaning of "an autonomous-power switch" in integer 1.8

35. By reason of integer 1.8, claim 1 relates to an invention:

> "wherein an autonomous-power switch, for example, a radio switch or a signal transmitter, is supplied with electrical power by the electromagnetic converter"

36. For the Claimant, Mr Conway submitted that the words "an autonomous-power switch" must refer to a true switch – a component that can be controlled to bring about a state-change in a remote device - i.e. to turn it on/off or to activate/deactivate it. In support, he pointed to the exemplary uses described in the specification – i.e. radio switches such as in a motor vehicle locking system, where

the converter powers a radio signal that causes a state-change in the vehicle's locks. He argued that what distinguishes the "autonomous-power switch" of the Patent from a simple switch is the fact that it is powered by electricity from the electromagnetic converter (as reflected in the wording of paragraphs [0010] and [0018] as well as of integer 1.8 itself). The autonomous-power switch is, therefore, referring to a switch component that is downstream of the converter and is distinct from the converter and from the button that operates the converter.

37. For the Defendants, Mr Hill acknowledged that paragraph [0010] referred to the switch being "downstream" from the converter but argued that that must be read in the light of:

    a. Paragraph [0001] – which states that the invention relates to the use of an electromagnetic energy converter "***in*** radio switches and radio sensors";
    b. Paragraph [0002] – which states: "For example, a radio switch, such as is known as a control element in a motor vehicle locking system with radio control, ***contains*** an energy supply in the form of an accumulator or battery in addition to its electronic components". Although, I note that paragraph [0002] is somewhat inconsistent in that in the very next sentence it refers to "the switch and the accumulator" as being components of "the device";
    c. Paragraph [0016] which, in relation to an embodiment, states that there is "no need for an additional switching element, as this is formed ***in*** a functional unit with the energy converter"; and
    d. Paragraph [0017] which, again, refers to the converter being suitable for use ***in*** wireless switches, for example.

    (emphasis added).

38. These paragraphs, Mr Hill submitted, showed that "the switch" did not have to be something that was downstream (in the sense of being separate) from the converter and that, for the purposes of the Patent, the switch is the overall device which initiates/closes a circuit/allows power to flow.

39. The starting point is that, in the eye of the skilled person in this case, a switch would be something that can connect or disconnect the conducting path in an electrical circuit, interrupting or diverting the electric current. This much is agreed by the experts in their reports, subject to a point made by Professor Mitcheson in his second report, that the component in question can be controlled so as to change its state between on and off (conducting and non-conducting). It seems to me that this envisages the existence of an existing conducting path in the circuit (whether wired or wireless), with the switch being a device which allows the flow of power down that path to be turned on and off. It does not seem to me to cover, for example, a situation where a load is powered simply by the act of connecting (plugging) it into a live power source. In such a case, there is no existing path until the connection is made and there is nothing which can be called a switch that operates to connect/disconnect the flow of power to the load. It would be different if the power source to which the load is connected and/or the load has an on/off

button which turns on/off the flow of power down an existing path to the load. Such buttons would be switches.

40. The reference in the Patent to the switch being "an autonomous-power switch" indicates that the switch in question has its own power supply - i.e. the electromagnetic converter. To use the example of the car locking system, the electronic circuit that emits a radio signal that causes the car doors to lock or unlock is powered by the electromagnetic converter and is autonomous from the car or the car's locks.

41. The Patent clearly envisages that the converter can be housed in the same unit as the circuitry that acts as switch. Indeed, this is expressly stated at paragraph [0033]. This gives rise to the question whether, in such a case, the "switch" could be taken to be the unit as a whole (as Mr Hill suggests) or merely as the circuitry that acts as a switch (as Mr Conway argues). I agree with Mr Conway. In my judgment, paragraph [0021] and Fig.2 (read in the light of the "List of reference signs" in paragraph [0035]) clearly envisage and show the "energy-autonomous switch, electronic circuit" (which must, in my judgment, be the same thing as the "autonomous-power switch") as being distinct from the elements that make up the converter, albeit that the power for the switch's circuitry is provided by the converter. This also seems to me to be clear from paragraph [0010] and, properly read, from paragraph [0016] as well.

42. Ultimately, taking as an example a device such as a remote control for switching something on/off (a television remote control or a car remote locking fob), given how the experts characterise a switch, it seems to me that the skilled person might say that that device is used to switch something on or off but would be unlikely to say that the device as a whole is a switch. The device merely contains a switch which is powered by a battery or, in the case of the Patent, by an electromagnetic energy converter, contained within the device.

Meaning of "a spring element" in integer 3.1

43. Claim 3 relates to an electromagnetic energy converter, such as that under claim 1, but with the additional requirement that it is one:

> "wherein a spring element makes the second rest position unstable, so that the moving element returns to the first rest position after a movement to the second rest position".

The second construction issue is as to the meaning of the words "a spring element" in Claim 3.

44. It is common ground that the words "a spring element" would cover the situation where there is a mechanical spring which operates to return the moving element in an electromagnetic generator from the second rest position to the first rest position. However, Professor Chatwin commented (in Annexes 5 and 6 of his first

report) on how the operation of magnetic forces to cause the moving element in an electromagnetic generator to return from its second rest position back to its first rest position was "based on the principles of magnetic spring" [2] which principles were, he said, "…well known, in fact there are even magnetic supension [sic] for vehicles/trains (instead of coil metal springs)". Then, in his second report, he gave evidence of experiments (apparently post-dating the priority dates) including one in which the mechanical spring in a pogo stick was replaced by a magnetic spring comprising a series of magnets.

45. On this basis, Mr Hill argued that, taking a functional construction of integer 3.1, what the Patent is concerned with is something which performs the function of causing the moving element to return from its unstable second rest position back to its original rest position and that, as the magnetic forces operating as explained by Professor Chatwin perform that function, they are "a spring element" within the meaning of claim 3.

46. Mr Conway disagreed. He submitted that the skilled person reading the Patent would understand the reference to a "spring element" as being a reference to a physical device operating mechanically to return the moving element to return from its unstable second rest position back to its original rest position and not to the operation of magnetic forces. He also argued that such construction is consistent with the way in which the spring element was described in the Patent specification. I accept those submissions.

47. As a starting point, whilst it was common general knowledge that a magnetic force could have the same effect as a spring (i.e. to return something to its original position), there is no evidence that the skilled person (as at April 2003) would have referred to magnets operating in this way as "a magnetic spring". In my judgment, "magnetic spring" as a term was not part of the common general knowledge.

48. Further, in my judgment, the fact that integer 3.1 uses the word "element" in relation to the spring would cause a skilled person to conclude that the Patent was referring to a physical thing (an element) and not to the effect of magnetic forces.

49. The conclusion that the Claim 3 was referring to a physical (mechanical) spring would be reinforced by how the Patent specification referred to the spring element. I note, in particular:

    a. The references in paragraph [0012] to the moving element being "extended by a spring element" and to the "addition" of the spring element. Such references suggest the spring element has a physical presence and are difficult to reconcile with its being a magnetic force. Paragraph [0012] also talks about how the moving element is moved against "a spring force"

[2] Prof. Chatwin referred to the as a repelling force whilst Prof. Mitcheson argued that it was an attractive force. For present purposes, the point is probably academic.

(which spring force then pushes the moving element back into its original position). Whilst the words "spring force" taken by themselves could be consistent with the operation of a magnetic force, paragraph [0012] makes clear that the spring force is provided by "a spring element" which, as set out above, is not how one would generally refer to a magnet providing a magnetic force.

b. The reference in paragraph [0013] to the moving element being equipped with a dead-centre mechanism which is "in connection" with the spring element again suggests that the spring is a physical element.
c. Even more significant is the reference in paragraph [0014] to its being advantageous "to structurally combine the moving element and the spring element" and also "to tension the moving element in structural unity with a spring element". This presupposes that the spring element has a physical presence. The same is true later in paragraph [0014] where is states: "[w]hen the spring element is pressed…".
d. The same can be said about paragraph [0015] which states that "one of the concentric rings is connected to the spring element in such a way that it is moved with the spring element…".

Whilst each of these paragraphs relates to a specific embodiment of the invention, they all envisage a physical spring and, significantly, in framing Claim 3 of the Patent, the patentee chose to use the words "spring element" and not the words (of which he was clearly aware) "spring force".

The prior art

50. I turn now to the prior art which, the Defendants assert, anticipates the relevant claims of the Patent and/or renders them obvious.

Harding

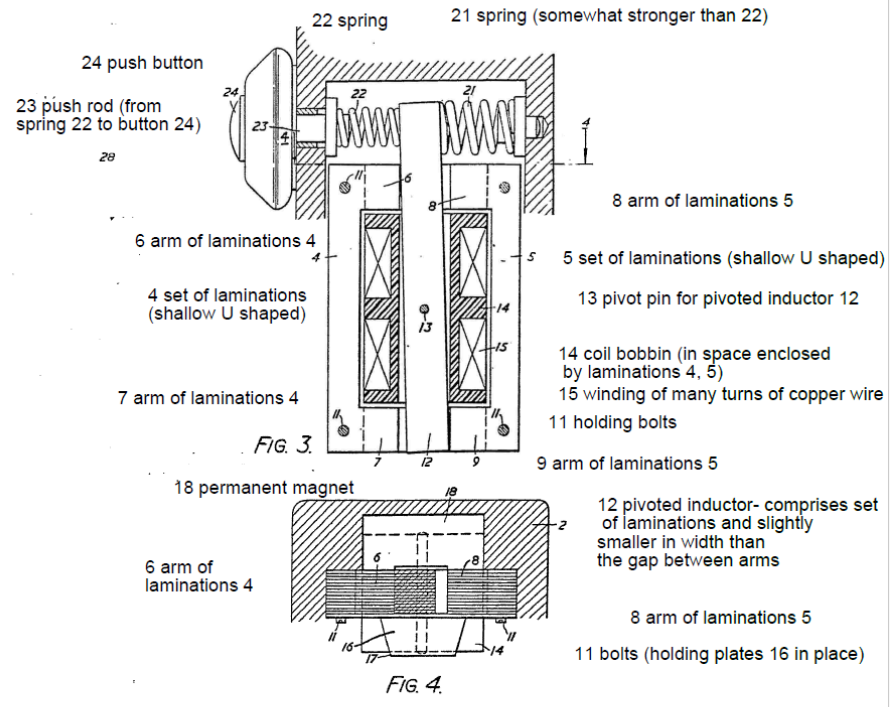
51. The first piece of prior art is Harding. This is a GB Patent filed on 3 February 1958 and published on 11 October 1961. It is entitled "Improvements in or relating to electrical generators" but it is said to relate to "electrical generators for use more particularly for the charging of dosimeters of the quartz fibre type". Consistently with this, claims 1 to 6 of Harding make claims in relation to electric generators for delivering comparatively high unidirectional voltage, but without reference to any particular ways in which such generators could be used and it is only claims 7 to 9 that relate to such a generator specifically for use as a charging unit for a dosimeter.

52. Harding explains how the invention sets out to provide a simple electric generator which is particularly adapted for hand operation and is able to deliver electricity in small quantities but with a comparatively high voltage (around three hundred volts). It states that, when used to charge a dosimeter, the advantages of the invention are that no external power supply is necessary (clearly meaning mains or battery power) and that the whole circuit can be hermetically sealed.

53. Harding describes a generator formed of a coil of wire, a permanent magnetic circuit passing through the coil, a movable magnetic inductor capable of snap reciprocating movement "by application of an external reciprocating force in conjunction with attractive action of the magnetic flux to vary magnetic flux around the circuit" thereby causing an alternating voltage to be generated in the coil, which is then used to supply energy. Harding then describes a preferable arrangement where there are two permanent magnetic circuits with fluxes passing in opposite directions through the coil and where the movable inductor is arranged for attraction to either of two alternative positions in one of which flux is considerably larger than the other. Harding states that this embodiment preferably includes two springs; a first spring which urges the movable inductor into one position and a second spring opposed to the first and through which part of the external reciprocating force is applied (preferably by a push button).

54. An embodiment of the invention included in a dosimeter charging unit is then described and depicted in five Figures, some depicting the charging unit as a whole, others just the generator. Mr Hill's skeleton reproduced Figures 3 and 4 (which show the generator) with annotations added as follows:

push rod 23 extending from spring 22 through casing 2 terminating in push botton 24



16 - 2 phosphor bronze plates (which bridge the pairs of arms 6, 8 and 7, 9)

lug 17 on each of phosphor bronze plates which extends to clamp the end cheek of the bobbin 14

55. Harding explains that, in this embodiment, pushing button 24 causes spring 22 to compress until the magnetic attraction between the inductor 12 and arms 6 and 9 is overcome and the inductor moves away and comes into contact with arms 7 and 8. When pressure on the button 24 is released, the compression on spring 21 is sufficient to overcome the magnetic attraction which now holds the inductor to

arms 7 and 8 and causes the inductor to be returned rapidly to its original position. Electricity is generated by both movements and the design is such that the reversal of the magnetic flux in the inducer is attained in a very short time, thereby inducing high voltages.

56. Figure 5 of Harding (shown below) shows how the electricity so generated is supplied to the dosimeter through an arrangement of a reservoir condenser (26), a half way rectifier (27), a second half way rectifier (28), a second reservoir condenser (29), a resistor (33) and finally pin (34), to which the charging pin of the dosimeter is connected. A bleed resistor (31) is included to ensure that the excess charge accumulated through multiple presses of the button can slowly leak away.

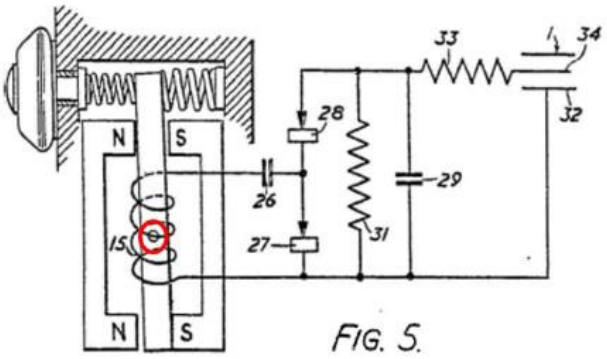


FIG. 5.

Novelty over Harding

57. There is no dispute over the law regarding novelty. A patent lacks novelty if a piece of prior art clearly and unambiguously discloses all the features of its claims. Such disclosure can be implicit as well as explicit (*Edwards v Boston Scientific* [2017] EWHC 405 (Pat) at [139]).

58. In this case, the Claimant relies solely on claims 1 and 3, which it asserts are independently valid over Harding. It is common ground that Harding discloses an electromagnetic energy converter that meets integers 1.1 to 1.7 and 1.9 of the Patent and also the integers of claim 3 over and above those of claim 1 (the presence of a spring element to cause a return of the moving element back to the first resting position[3]). Therefore, the only issue as to novelty is whether Harding also discloses integer 1.8, namely something "wherein an autonomous-power switch, for example a radio switch or a signal transmitter, is supplied with electrical power by the electromagnetic converter".

59. When giving evidence, Professor Chatwin abandoned the suggestion made in his report that the bleed resistor shown as part of the invention in Harding constituted an autonomous-power switch within the meaning of integer 1.8. Accordingly, Mr Hill's argument at trial was simply that the device disclosed in Harding, taken as a whole, is an autonomous-power switch in the sense that the pushing of the button

[3] i.e. spring (21) shown in Fig.4.

(24) in Harding switches on (in an autonomous way) a transfer of charge to the dosimeter (or other load). On that basis, he argued that integer 1.8 was disclosed by Harding.

60. I reject that argument. In my judgment, as discussed earlier, a device made according to Harding, taken as a whole, is not a switch. The device as a whole does not operate to turn the flow of power down an existing conducting path on or off. Rather, it operates to generate power. In effect, what Harding discloses is an electrical generator (one that could provide a source of power for a device such as a dosimeter), it does not disclose an electromagnetic converter wherein an autonomous-power switch is supplied with power by the converter. As Mr Conway argued, if a device (such as that in Harding) which generates electricity upon the pushing of the button could of itself be said to constitute an autonomous-power switch, then integer 1.8 would appear to be otiose.

Obviousness over Harding

61. If Harding does not disclose integer 1.8, the next issue is whether it renders that integer obvious.

62. There was little debate as to the relevant legal principles.

63. As appears from *Actavis v ICOS* [2019] UKSC 15, per Lord Hodge at [60], in deciding the issue of obviousness, the courts commonly adopt the so-called *Windsurfing/Pozzoli* four-step approach[4], namely: (1) identifying (a) the relevant skilled person and (b) the relevant common general knowledge, (2) identifying the inventive concept of the claim (or if that cannot readily be done, construing it), (3) identifying what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim and (4) asking whether, viewed without any knowledge of the alleged invention as claimed, those differences constitute steps which would have been obvious to the person skilled in the art or whether they would require any degree of invention.

64. Guidance as to how the court should approach step (4) was provided by Kitchin LJ in *MedImmune Ltd v Novartis Pharmaceuticals Ltd* [2012] EWCA Civ 1234, at [89], [92] and [93] as follows:

> "89. It is step (4) which is key and requires the court to consider whether the claimed invention was obvious to the skilled but unimaginative addressee at the priority date. He is equipped with the common general knowledge; he is deemed to have read or listened to the prior disclosure properly and in that sense with interest; he has the prejudices, preferences and attitudes of those in the field; and he has no knowledge of the invention."

[4] Derived from *Pozzoli SPA v BDMO SA* [2007] EWCA Civ 588 at [23].

> "92. Moreover, whether a route is obvious to try is only one of many considerations which it may be appropriate for the court to take into account. In *Generics (UK) Ltd v H Lundbeck* [2008] EWCA Civ 311 …at [24] and in *Conor* [2008] UKHL 49 … at [42], Lord Hoffmann approved this statement of principle which I made at first instance in *Lundbeck*:
>
> > "The question of obviousness must be considered on the facts of each case. The court must consider the weight to be attached to any particular factor in the light of all the relevant circumstances. These may include such matters as the motive to find a solution to the problem the patent addresses, the number and extent of the possible avenues of research, the effort involved in pursuing them and the expectation of success."
>
> "93. Ultimately the court has to evaluate all the relevant circumstances in order to answer a single and relatively simple question of fact: was it obvious to the skilled but unimaginative addressee to make a product or carry out a process falling within the claim. As Aldous LJ said in *Norton Healthcare v Beecham Group Plc* (unreported, 19 June 1997):
>
> > "Each case depends upon the invention and the surrounding facts. No formula can be substituted for the words of the statute. In every case the Court has to weigh up the evidence and decide whether the invention was obvious. This is the statutory task."

65. While the skilled person is deemed to read the prior art with care and interest, he or she does not have any expectation in advance of doing so that the prior art will be useful, either generally or for something specific. As Laddie J explained in *Inhale v Quadrant* [2002] RPC 21 at [47]:

> "… The notional skilled person is assumed to be interested in the field of technology covered by the patent in suit, but he is not assumed to know or suspect in advance of reading it that any particular piece of prior art has the answer to a problem that he faces or is relevant to it. He comes to the prior art without any preconceptions and, in particular, without any expectation that it offers him a solution to any problem he has in mind. Some pieces of prior art will be much more interesting than others. A document directed at solving the particular problem at issue will be seized upon by the skilled addressee. Its very contents may suggest that it is a worthwhile starting point for further development. But the same may not be the case where a document comes, say, from a distant and unrelated field. For example, in theory a notional skilled person engaged in trying to improve the operation of an internal combustion engine is assumed to know, have read and assimilated the contents of all published material including those, say, in the baking field. It may be that a document in the latter field discloses something which, if applied to the internal combustion art, would produce a marked improvement in performance. However, the person skilled in the art is not deemed to read the baking document in the knowledge, or even with a suspicion, that it is of significance to the problems he has to deal

> with. It may be that it is written in such a way that, although he understands it, the skilled person will dismiss it as irrelevant to his work. The more distant a prior art document is from the field of technology covered by the patent, the greater the chance that an intelligent but uninventive person skilled in the art will fail to make the jump to the solution found by the patentee."

66. In relation to this passage from *Inhale*, Floyd LJ in *E Mishan & Sons v Hozelock* [2020] EWCA Civ 871, at [90], commented that:

> "It is important to understand what Laddie J. meant by a "problem he has in mind" and "an answer to a problem he faces". If the art is facing a particular unsolved problem, then a reading of a prior document from a wholly different field which suggests a specific solution to that problem may indeed cause the skilled person to seize on it. But the same is not true merely because the remote document discusses a design consideration which is also a design consideration for his own field. The skilled person may have common general knowledge ways of satisfying the design consideration in his field, so that achieving it is no longer a problem that he faces."

67. Mr Conway referred me to other parts of *Hozelock* including at [91]-[94] where Floyd LJ noted that there could be less force in an obviousness argument where the prior art in question is old and/or unimplemented and/or a mere paper proposal and at [95]-[98] where Floyd LJ warned against the danger of hindsight in determining the issue of obviousness, particularly in the case of what might appear to be a simple invention.

68. Finally, the issue of the skilled person's motivation to implement the disclosure from the prior art so as to take the steps needed to arrive at the invention is clearly an important one. However, as noted by Daniel Alexander QC in *Meter-Tech v British Gas* [2016] EWHC 2278 (Pat) at [325], in some cases it can be dangerous to make too much of the issue of motivation. As Mr Alexander pointed out, applying a prior art disclosure so as to make a product can be obvious even though the skilled person would have had no motivation to take that step and he gave the example of a 100cm dining plate. Ultimately, as Mr Alexander QC pointed out at [326], the question is whether the step involved is technically obvious or whether it is inventive and the court should not become side tracked by issues of whether the step would actually have been taken in view of commercial or regulatory reasons.

69. Applying that law in relation to Harding, I have already dealt with who the skilled person is in this case and with the common general knowledge attributable to that person and, so far as I could tell, Mr Hill did not dissent from Mr Conway's identification of the inventive concept of integer 1.8 as being the use of the electrical energy generated by an electromagnetic energy converter for powering

an energy autonomous switch such as a radio switch.[5] The issue, therefore, is whether, the step from Harding to that concept would have been obvious to the skilled person or whether it was inventive.

70. In his submissions, Mr Conway argued that the response of the skilled person to Harding would be affected by the fact that, in patent terms, Harding is ancient (almost 50 years old) and by the fact that the only use of the generator suggested in Harding was in relation to dosimeters, of which the skilled person would have no knowledge and which the skilled person would not see as being relevant to the sort of low power electronic devices with which he or she was concerned and which post-dated Harding by decades. In support, Mr Conway relied on the evidence of Professor Mitcheson to the effect that the skilled person would see Harding as a product of its time and as being unsuitable for use in powering low power, low voltage electronic devices because of uncertainties over the level of power it could generate and because the size of the device envisaged in Harding would be "quite large". Professor Mitcheson also suggested that the skilled person would take the view that, by 2003, the problems which Harding was intended to address (the need to avoid having to use an external power supply and for the device to be hermetically sealed) had been solved by, amongst other things, improvements in battery technology; improvements which had led to batteries being the go-to technology for powering the sort of devices in which the skilled person was interested. For these reasons, Mr Conway submitted that the skilled person would not come to Harding with any particular motivation to find a replacement for batteries as a power source and that it would not have been obvious for the skilled person to do anything with Harding. There was, he argued, nothing that would lead the skilled person to believe that Harding offered any means of improving the design of the sort of devices with which the skilled person was concerned.

71. I reject these submissions for the following reasons.

72. In the first place, it is true that Harding is a relatively old patent but that does not mean that the skilled person would not be interested in its disclosures. The skilled person is assumed to read any prior art with interest and its age would not matter if he or she perceived something in it which was relevant to the problems concerning the skilled person.

73. Second, it is no doubt correct that the skilled person in 2003 would have taken the view that, given improvements in battery technology, the particular problems at which Harding was directed in 1957 (the need to avoid an external power supply and to be hermetically sealed) were no longer problems and could be addressed using batteries. However, that is not the point. As set out in the Patent at paragraph [0002], the particular problems facing the skilled person in 2003 were the need to

[5] Although Professor Mitcheson, during cross examination seemed to argue that what made this inventive was that it allowed a device to be made using a dead-centre mechanism to generate high power and a dome construction although those features are not apparent from the wording of the claims of the Patent.

find a power source which did not have the problems that existing power sources had in terms of size and/or maintenance needs (including, in the case of batteries, the need periodically to replace them). The issue is whether the skilled person would have seen the disclosures in Harding as being relevant to those problems.

74. Third, the issue of maintenance (including the need to replace batteries) was something of which the skilled person would have been aware as at 2003.[6] In his evidence, Professor Mitcheson accepted that, even as at 2003, there was some desire to get rid of a battery. He stated that "there is always a benefit from not having to change a battery. The question then really comes down to what are the trade-offs if I decide not to use a battery and use another mechanism instead". In this regard, he argued that, for the type of applications with which the Patent was concerned, the fact that the battery has to be occasionally changed was "not seen as being a massive issue". Later, he accepted that removing the need to replace a battery was not "of zero advantage" and he commented that: "If I have a car key that requires me to press a button in order to be able to unlock the vehicle, then never having to change the battery is of some advantage, although I come back to the fact that replacing the battery in that circumstance is not difficult. It is done at a dealer service ----". Having said this, he accepted that there can be situations where the inconvenience of replacing a battery would be an issue. His example of such a situation was where the device is in an awkward place. Mr Hill's examples were where the device is located in a space station where handling small batteries would be difficult or is in a remote location where finding replacement batteries might be impossible. In my judgment, whilst batteries were generally the go-to source of power for the sort of devices with which the skilled person was concerned, there was still reason (or a motive) for the skilled person to be interested in alternative sources of power, such as that disclosed in Harding. Indeed, as mentioned above, there were already a number of alternatives to battery power within the common general knowledge of the skilled person, some of which involved electromagnetic generators.

75. Fourth, I do not accept that the skilled person, having read Harding, would have concluded that it was concerned only with a source of power for a dosimeter (a type of electrical load that was outside the common general knowledge of the skilled person) and would have taken it no further on that basis. Although Harding states early on that the invention relates to "electrical generators for use more particularly for the charging of dosimeters" and then describes embodiments used for that purpose, the title of the invention ("Improvements in or relating to Electrical Generators") and claims 1 to 6 of Harding show that the device was intended to be of far more general application. It is only at claims 7 to 9 that Harding refers to its being used to charge a dosimeter. Nor do I accept that the skilled person would have seen Harding as being (to use the phrase from *Inhale*) from a distant and unrelated field. The skilled person may not have known about dosimeters but he or she would have been well aware simply by reading Harding

[6] I note that the inconvenience of batteries was something that was mentioned in Goiran, an application filed in 1997 (see below).

that a dosimeter is a form of electrical load which required a source of power. The fact that Harding disclosed a (non-battery) source of power for a such a consumer (to use the word used in the Patent at [0021]) or load would have been of great interest to the skilled person interested, as he or she was, in the problem of finding a (non-battery) source of power for a different sort of consumer or load (i.e. for an autonomous-power switch). Accordingly, I agree with Professor Chatwin's conclusion that, having read Harding, the skilled person would have been interested in its disclosures. Indeed, in my judgment (and to use the words of Laddie J in ***Inhale*** quoted above), Harding was a piece of prior art that the skilled person would have seized upon.

76. Fifth, I do not accept Mr Conway's argument that the skilled person would not have been interested in Harding because he or she would have seen it as disclosing a device producing a high voltage (300 volts) and a low current – meaning it would be unsuitable for the devices with which the skilled person was concerned. In re-examination, Professor Chatwin's evidence (which I accept) was that it would be a trivial matter to step a voltage down using well known techniques and he pointed out that, in Harding, the 300 volts was actually produced by multiple presses of the operating button and so lower voltages were perfectly feasible. Professor Mitcheson's evidence was that the changes needed would have involved calculations that, whilst they were "well-worn maths" for a mathematician, would be outside the skilled person's comfort zone. However, in my judgment, the fact that the skilled person may not have been comfortable doing the calculations is not the point. The point is that he or she would have been well aware that the adjustments could be made and that it was simply a matter of finding someone who could do the calculations. Indeed, when it was put to Professor Mitcheson in cross examination that the skilled person would not be worried about the voltage figures referred to in Harding because "… they would know 'I can just step down the voltage as required using the known methods'", he replied:

> "Yes. I am not suggesting actually that the skilled person would not know how to do that. For the reasons you described, counsel, then they would. The issue I have with Harding is the motivation of the skilled person to even pursue that."

Similarly, in his closing submissions, Mr Conway twice stated that he did not disagree with the point that the skilled person would know that the voltage can be adjusted within his or her common general knowledge and that the Claimant's "more simple point" was that the skilled person would see Harding as dealing with a completely unrelated field (an argument which, as set out above, I do not accept).

77. Sixth, as mentioned above, part of Mr Conway's case was that the skilled person would not be interested in pursuing Harding because, as Professor Mitcheson said, a device made according to Harding was likely to be "quite large" and that the skilled person would conclude that as "it is a bit bulky, it is not going to work very well in my portable applications". Mr Conway pointed out that Professor Chatwin

had accepted that a skilled person would conclude that a device made according to Harding would not be as compact as a modern battery-powered device. In my judgment, however, this is an example of the danger to which Mr Alexander QC referred in *Meter-Tech* at [325]-[326] (see above). The issue is, ultimately, one of inventiveness and, as with Mr Alexander's example of the 100cm dinner plate, the fact that the skilled person would not be motivated to take an idea forward because it would be commercially unattractive to do so, does not make that idea inventive. In the present case, the fact that the skilled person, having considered Harding, might conclude that the size of the device might not work well with portable applications, does not mean that the idea of using the device to power an autonomous-power switch must be inventive over Harding. It simply means that the skilled person would see a commercial reason for not carrying the idea forward.

78. For these reasons, I find that the step from Harding to the inventive concept of claim 1 (the use of the generator disclosed with an autonomous-power switch) would have been obvious to the skilled person and required no inventiveness. On that basis, Harding renders integer 1.8 of the Patent obvious and, as Harding also discloses the other integers of claim 1 and of claim 3 and as there are no other claims said to be independently valid, I find that the Patent is invalid.

Goiran

79. In case I am wrong in relation to Harding, I will now consider the second piece of prior art, Goiran.

80. Goiran is a European Patent Application that was filed on 10 September 1997 and published on 15 April 1998. It is entitled "Remote-control device and electric installation comprising such a device" and it starts by explaining that this device comprised a transmission means, a power supply circuit connected to the transmission means, a generator supplying electric energy connected to the supply circuit and a control unit. The control unit operates to actuate the generating unit (comprising an electromagnetic induction coil, circuitry and a permanent magnet) causing it to generate electricity which is used to power the device's means of transmission.

81. Goiran then refers to known remote control devices with autonomous transmitters which were powered by the energy distribution grid (and therefore required a connection via electrical lines) or by batteries (which require replacement making use of the devices inconvenient, costly and, if batteries are discharged or are unavailable, risky). The invention, therefore, is said to relate to an invention whereby the transmitter is powered by an electromagnetic generator.

82. There then follows descriptions of and various Figures showing embodiments of the invention.

83. Figures 2 and 3 depict one embodiment of the transmitter element of the device, featuring a control unit (12)[7] which, when operated, leads to the generation of power by a generator such as that shown in the embodiment in Fig.4[8]:

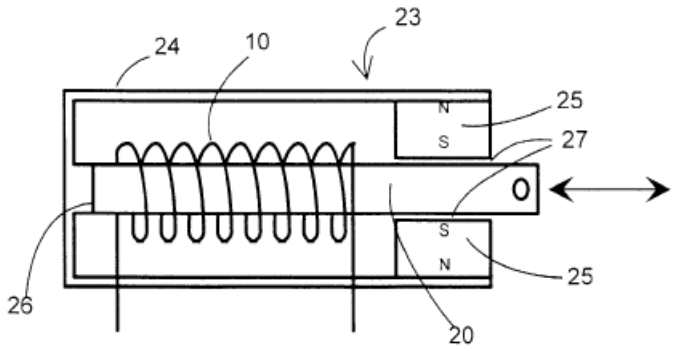


FIG.4

In Fig.4, the core (20) is shown in its initial position in contact with a contact area (26) towards the bottom of the armature (24), into which position the core is pulled and maintained by the magnetic forces created by the permanent magnets (25). In this position, the magnetic circuit is closed. When the core (20) is pulled away from that contact area by mechanical action (i.e. by the operation of the control unit (12) referred to above), that magnetic circuit opens, causing a significant change in magnetic flux and the generation of electric energy. Then, when the mechanical action on the core ceases (i.e. when the control unit is released) the core is pulled back into its initial position (that which is shown in Fig.4) by the magnetic forces of the permanent magnets. Therefore, as Goiran explains, the magnets have two functions. The first function is to generate magnetic flux when the magnetic circuit is closed, such that when the core is moved, the magnetic flux drops abruptly and the change in magnetic flux causes electric energy to be generated. The second function is thereafter "to return the core to its initial position" and Goiran notes that, in order to allow the magnets to perform that second function, the movement of the core must be limited so that it is less than the maximum distance for the magnetic force to effect such a return (a distance which in the case of Fig.5 is shown as less than 4mm).

84. Figure 8 of Goiran (below) provides more detail as to how the key (12) operates to cause the generator (23) to generate electricity.

[7] An embodiment of which can be seen in Fig.8 below. Goiran also refers to this key as a "toggle control unit" and as "having the form of a circuit breaker or toggle push button".
[8] This generator is also shown in Figs.6 and 7. Fig. 5 shows a broadly similar embodiment of a generator.

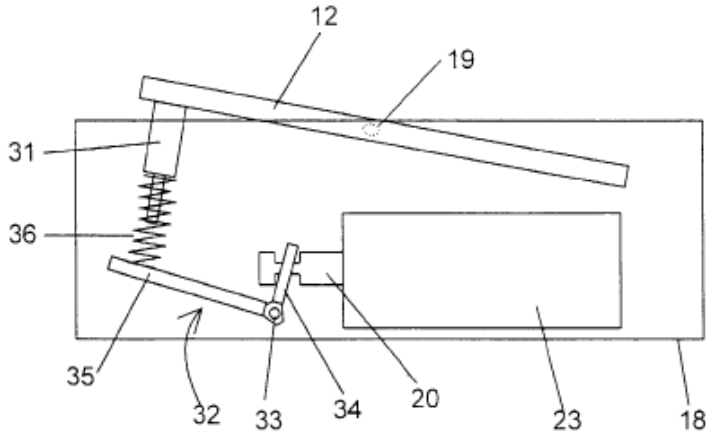
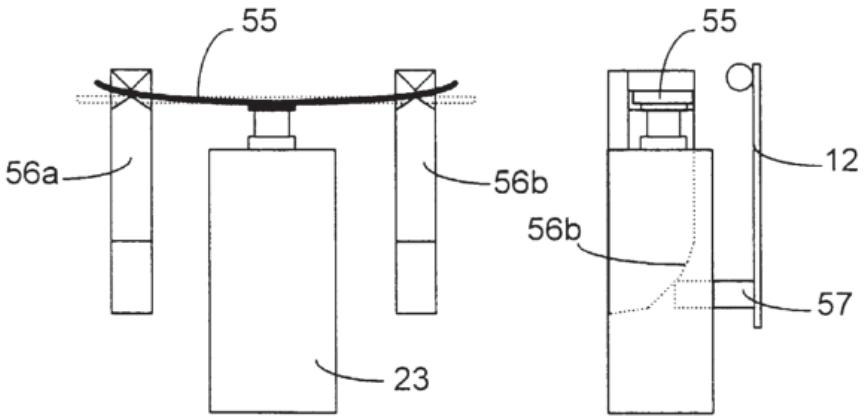


FIG. 8

85. In Fig.8, the generator unit (23) starts with a closed magnetic circuit (as in Fig.4). Goiran explains that the generator is actuated by key (12) being pressed. Stop (31) then moves down, compressing the spring (36), until the stop comes into contact with part (35) of the pivoting bracket (32) with enough force that the other part of the bracket (34) (pivoting around the pivot (33)) is able to pull on the core (20) so as to begin to open the magnetic circuit within the generator (23). This reduces the magnetic force which is holding the core in place at which point, the spring (36) releases its stored mechanical energy thereby accelerating the movement of the core and completing the opening of the magnetic circuit. As explained when dealing with Fig.4, this opening of the circuit generates electric energy and Goiran explains that, in this embodiment, the amount of electric energy generated "is greater since the mechanical energy of the movement of the key is accumulated in the spring to enable a rapid detachment of the core".[9] Thereafter, once the mechanical action on the core ceases, the core is pulled back into its original position by the magnetic forces of the permanent magnets in the generator (thereby closing the circuit again). This, in turn, causes the bracket (34) and (35), stop (31) and key (12) also to return to their original positions as shown in Fig.8.

86. Figures 10, 11 and 12 show variations of the mechanisms by which mechanical force can be used to cause a generator to generate electricity. However, the operating principles remain much the same: a mechanical force is imparted by the user; the mechanical energy is initially stored in a spring (a coil spring in Figs.10 and 11 and a leaf spring in Fig.12) which then operates to cause a movement of the core thereby inducing a change of magnetic flux and the generation of electrical energy. In relation to Fig.12 (shown below), Goiran explains that "When the sliding parts [(56a and 56b)] are put into motion, the leaf spring [(55)] is bent until the moment of detachment of the core. Then, the spring resumes its initial shape appreciably, rapidly moving the core according to a predefined course" (number cross-references added).

[9] Which the experts agree discloses the dead-centre mechanism to which the Patent refers in paras.[0010], [0013] and Integer 1.7.



87. Therefore, Fig.12 (like Fig. 8) shows the use of a spring to cause a rapid movement in the core which, as set out above in relation to the common general knowledge, helps to increase the magnitude of the voltage induced in the coil.

88. Whilst Goiran does not expressly say, it is clear from Goiran's explanation of the operation of the generator shown in Fig.4, that in each of the embodiments shown in Figs. 8 to 12, the force that causes the core and the key (12) mechanism to return to their original positions is the magnetic force from the permanent magnets. Accordingly, it is clear that Goiran envisages a generator which starts with a closed magnetic circuit. This is because it is only then that, after the generator has been actuated (by moving the core and causing the circuit to open), the magnetic forces will operate to pull the core back into its original position (and to reset the key mechanism) as described above. If the position in Goiran was to be reversed so that the generator started with an open magnetic circuit, then the actuation of the generator would cause the magnetic circuit to close but that circuit would then remain closed as the magnetic force of the magnets would hold the core in that position rather than operating to return the core to its original positions (and reset the key mechanism). The system would not, therefore, reset to allow further operations to generate power.

89. It is worth noting that the device envisaged in Goiran is designed only to generate power on the opening of the magnetic circuit and not (in contrast to the position under the Patent and under Harding) also upon its closing.

Novelty over Goiran

90. It is common ground that Goiran discloses an electromagnetic energy converter that meets the integers of claim 1. There is, however, an issue as to whether it also discloses the integers of claim 3 over and above those of claim 1 - i.e. a generator:

> "wherein a spring element makes the second rest position unstable, so that the moving element returns to the first rest position after a movement to the second rest position."

91. In closing, Mr Hill abandoned his argument that Goiran had disclosed a mechanical spring by, for example, its references to a "circuit breaker" and to a "toggle push button". Instead he relied solely on the argument that the magnetic forces operating in the way described in Goiran amounted to a disclosure of a "spring element" within the meaning of claim 3. I reject this argument. Given my construction of the words "a spring element", I am satisfied that Goiran does not disclose a spring element within the meaning of claim 3. That claim does not, therefore, lack novelty over Goiran.

Obviousness over Goiran

92. If, as I have found, a spring element is not disclosed by Goiran, the next issue is whether it would be obvious to the skilled person to adapt Goiran to add a spring element (meaning a physical spring) to cause the second position to be unstable and to return the moving element to its first position.

93. Applying the *Pozzoli* approach to which I have referred, I have to identify the inventive concept in relation to claim 3. Neither party specifically addressed this issue. However, as claim 3 is said to be independently valid, I will assume that its inventive concept is the use of a spring element to cause the second rest position of the moving element to be unstable so that the moving element returns to its first rest position.

94. In his First Report, Professor Chatwin's argument with regard to Goiran was that it disclosed the use of magnetic forces to effect the return of the moving element and that it would be obvious to the skilled person that that could equally be achieved using a metal spring (a spring element). He illustrated this by reference to Fig.3 from Goiran but with an additional spring shown under the control unit (12) and, in his Second Report, by reference to Fig.8 with an additional bumper spring or a new soft spring shown under part (35).

95. Initially, Professor Chatwin also argued that the existing spring (36) shown in Fig.8 of Goiran would have operated to effect a return of the core to its first rest position. However, he seemed to accept in cross examination that, in the embodiment depicted in Fig.8 of Goiran, that was not the case and that the return force there was actually provided by the magnetic forces pulling the core back in to close the magnetic circuit.[10] Nevertheless, he asserted that it would be possible to make design changes to spring (36) such that it still retained some compression so that it could assist with the return.

96. Ultimately, Professor Chatwin's point in cross examination was that it was perfectly possible for the skilled person to design a system with springs that would effect both the opening and closing of the magnetic circuit whilst retaining the sort of snapping action (the dead-centre mechanism) needed to achieve a rapid change in magnetic flux. On this basis, he rejected the suggestion that the skilled person

[10] Presumably on the basis that, when the core is in its second rest position, the spring (36) has discharged its stored energy and would, therefore, be unable to initiate the return.

would not think of departing from the teaching in Goiran (and from a system relying on magnetic forces to effect the return). It all depended, he said, "on what snapping action you want, what speed you want it to go at, what current and voltage you want to generate" or "what performance [you] are trying to get out of the system". This might involve calculations of the forces required and the calibration of the tensions in the springs used, but it is simply a matter of design.

97. Professor Mitcheson's evidence in his written reports was that, under Goiran, it was the magnetic force which caused the moving element to return from the second rest position to the first rest position. There was, therefore, no need to add a return spring. He added that if the idea of adding a spring had occurred to the skilled person, it would have been rejected as it would be acting against the force which was seeking to effect a rapid opening of the magnetic circuit, thereby undermining the dead-centre effect and reducing the energy generated.

98. Professor Mitcheson's evidence presupposed that the position was as under Goiran. In other words that the mechanical force that moves the core, operates to change the magnetic circuit from closed to open so that, on the release of that mechanical force, magnetic forces in the generator would then operate to pull the core back into its initial position.[11] He was, however, asked in cross examination what the skilled person would think to do if that position was reversed (so that the mechanical force on the core operated to change the magnetic circuit from open to closed). Professor Mitcheson accepted that, in such an arrangement, the magnetic forces in the generator would not effect a return of the core to its original position[12] and that a spring would be the first thing that occurred to the skilled person as a means to effect such a return. However, he considered that such a course would give rise to "a little bit of extra complexity" and to particular difficulties with regard to the dead-centre mechanism.

99. One such difficulty was that, if a spring was added to effect a return of the core and of the mechanism, that spring would operate against the generation of power in the preceding movement of the core. Another difficulty was that, if the intention was to generate power in the return movement of the core, then if the return movement was taking the circuit from open to closed, there would be no magnetic latching power restraining the speed of the return. Accordingly, in order to create a dead-centre effect, some other form of catching mechanism would be required. Solving these difficulties would, Professor Mitcheson thought, require inventiveness. He considered Harding to be one inventive solution and the Patent, with its dead-centre mechanism combined with the closing of the magnetic circuit (as embodied in the dome switch) to be another – as both solutions resulted in a snapping effect both when opening and when closing the magnetic circuit.[13]

[11] See para.88 above.
[12] Because the magnetic circuit would be closed - see, again, para.88 above.
[13] In the case of Harding because the set-up of the magnets would act as a latch when the inductor is in both the first and the second rest positions.

100. A further point put to Professor Mitcheson in cross examination was that a spring might be needed if the core were to be moved beyond the power of magnetic forces to effect the return of the core. His response was that the obvious way to deal with this was (as was expressly done in Goiran) to limit the movement of the core so it would not move that far. He also questioned why the core would be allowed to move so far as it would not be generating power at that point.

101. Ultimately, Professor Mitcheson's point was that the step from Goiran to Claim 3 of the Patent would not have been obvious for the skilled person because it involved departing from the teaching of Goiran when there was little reason to do so, especially given the difficulties involved. Against this, Mr Hill pointed to a reference in column 2 of Goiran to a specific embodiment where "the control means comprise at least one key which actuates the means for opening *or closing* the magnetic circuit" (emphasis added). This, Mr Hill suggested, meant that the possibility of reversing the set up would have been in the mind of the skilled person. Professor Mitcheson's response was that was reading a lot into that single reference. I agree. Certainly, it was not clear to me what those words really meant given that, in fact, none of the embodiments shows a key operating to close a circuit and there is nothing else in Goiran to suggest a set up in which the closing was not achieved by magnetic forces nor any reason why the skilled person would want to create such a set up.

102. I have found this a difficult point. However, as set out below, I have come to the conclusion that Professor Mitcheson was correct and that the step from Goiran to Claim 3 would not have been obvious to the skilled person and that it would have involved inventiveness over Goiran.

103. I accept that the step involved the use of concepts that were part of the common general knowledge. I also accept that Goiran was not from an area of technology that the skilled person would have regarded as distant or unrelated. However, I do not accept Mr Hill's argument that the skilled person, faced only with Goiran and without relying on hindsight of the invention claimed by the Patent, would have thought of applying those concepts in order to move away from the disclosures of Goiran and to the inventive concept of Claim 3. What was required to make such a move went well beyond merely adapting Goiran and, as Mr Conway argued, would require the skilled person to ignore much of the teaching of Goiran and to abandon a relatively simple invention for something much more complicated and (probably) costly. Professor Chatwin argued that the changes needed to take the step were simply matters of design. However, in my judgment, those changes required inventiveness and went beyond mere workshop alterations. Given that Goiran would have appeared to provide a perfectly workable solution, I find that it is only by using impermissible hindsight based on a knowledge of the Patent that the skilled person might have thought of taking on that task.

104. There is a further point to make as regards the Defendants' argument that the step to Claim 3 would be an obvious adaptation to make of Goiran if the set-up of the magnetic circuit were to be reversed in the way suggested by Mr Hill. As Mr

Conway points out, the idea of such a reversal was first raised during Mr Hill's cross examination of Professor Mitcheson. The fact that it was not something to which Professor Chatwin referred in either of his reports or in his cross-examination does rather undermine the argument that it was something that the skilled person (who was merely looking at Goiran and who was not using hindsight) would have thought was obvious or, if the thought had occurred, that it was worth embarking on the complicated process of making the significant changes that would be needed in order to implement it.

105. For these reasons, I reject the argument that claim 3 of the Patent is obvious over Goiran.

Conclusion

106. In conclusion, I reject the Defendants' claim that Claims 1 and 3 of the Patent are anticipated by either Harding or Goiran and that Claim 3 was obvious over Goiran. However, I accept their claim that Claims 1 and 3 are obvious over Harding. On that basis and as there are no other claims that are said to be independently valid, I find that the Patent is invalid and liable to be revoked.

107. Finally, I wish to thank Counsel and the parties' solicitors for the sensible and helpful way in which this case has been presented and I would ask the parties to agree a draft order to give effect to the terms of this judgment.